INTUBATION IN THE ITU

DR JOHN VOGEL
ITU M+M

April 17, 2018
12:00
Anaesthetic library

Intubation may be the

most dangerous manoeuvre

you will perform in ITU

What's more dangerous ?

What's more dangerous ?

or

Mortality **1.3%**

BMJ 2008;337:a2654

ICU intubation–related cardiac arrest occurs in

2.7%

(-74% died)

De Jong et al (*Crit Care Med* 2017; XX:00–00

NAP 4 - Major complications of airway management in the UK

In ITU

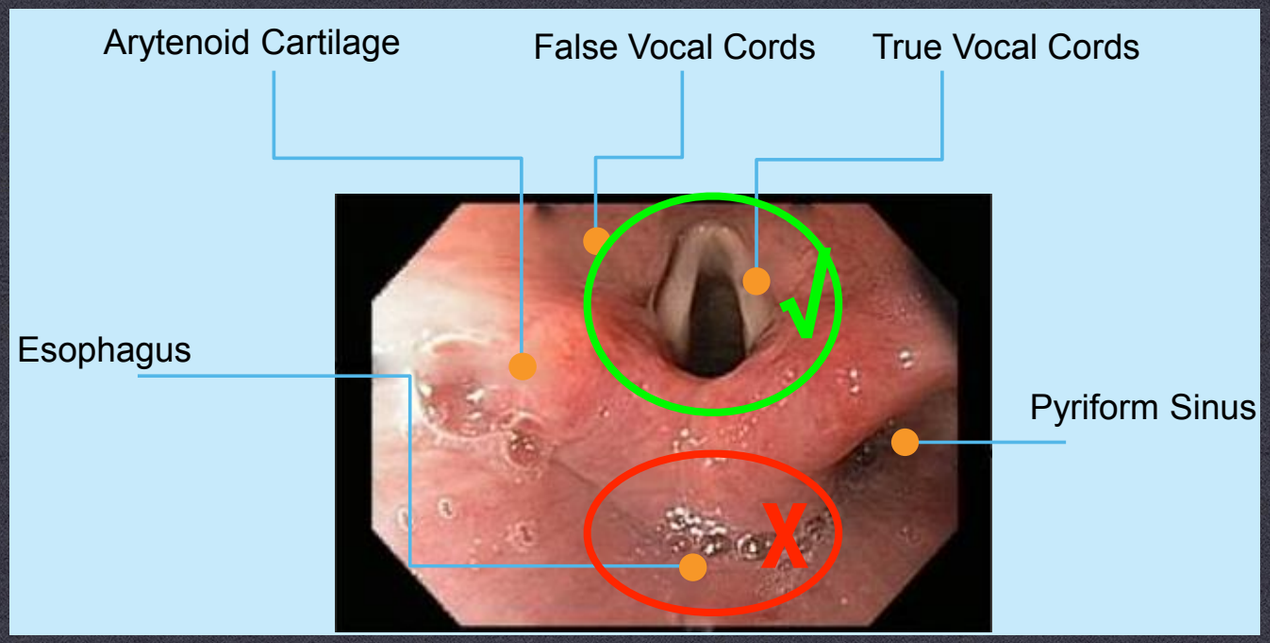
>60% of events lead to

>60 X greater then OR

Only 13 % were well managed

Accidental oesophageal intubation

NAP4 Report and findings of the 4th National Audit Project of The Royal College of Anaesthetists



- "~ 1 in 4 deaths unrecognised oesophageal intubation…
- "…capnography was not used"
- "auscultation routinely gave false positives…"

Why is this so dangerous?

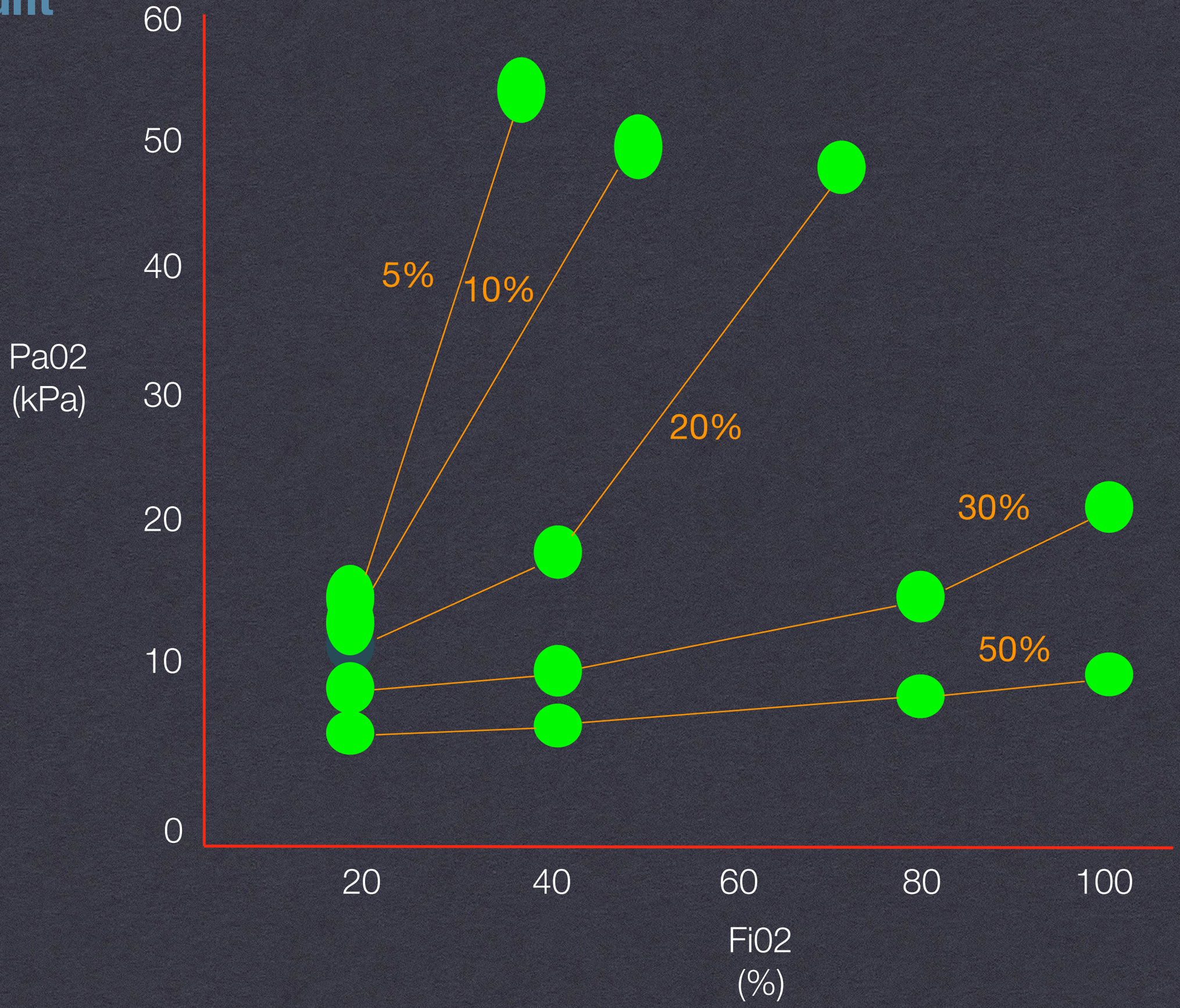
- Sick, stiff lungs/chest wall → high AWPressure → High CVP → swollen larynx
- ↑ Shunt
- ↓ FRC (“baby lung”)
- Increased metabolism

Beware re-intubations

This is <u>not the same</u> as the operating room !

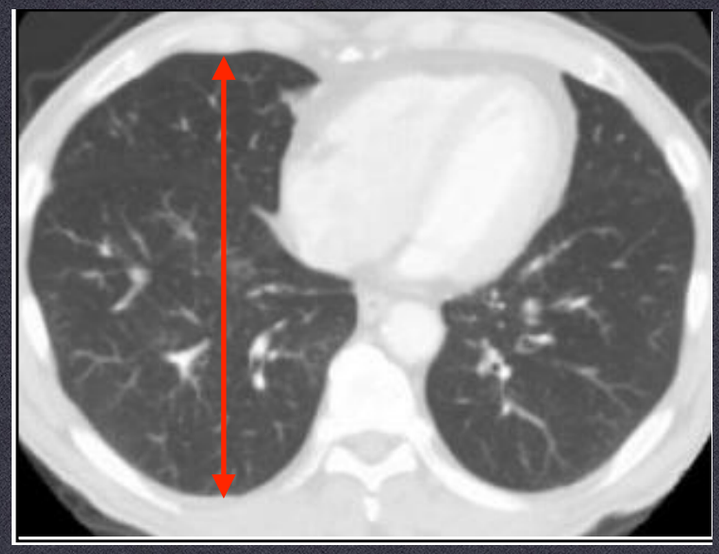
- Rapid desaturation despite pre-oxygenation
- Difficult mask ventilation (oesophagus is line of least resistance)
- Muscle relaxants not what you expect
- Detection of oesophageal intubation
- CV effects

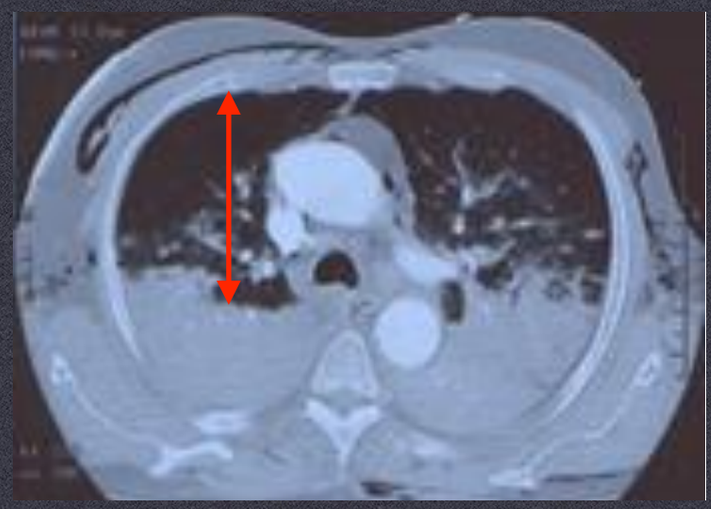
Shunt



↓ FRC

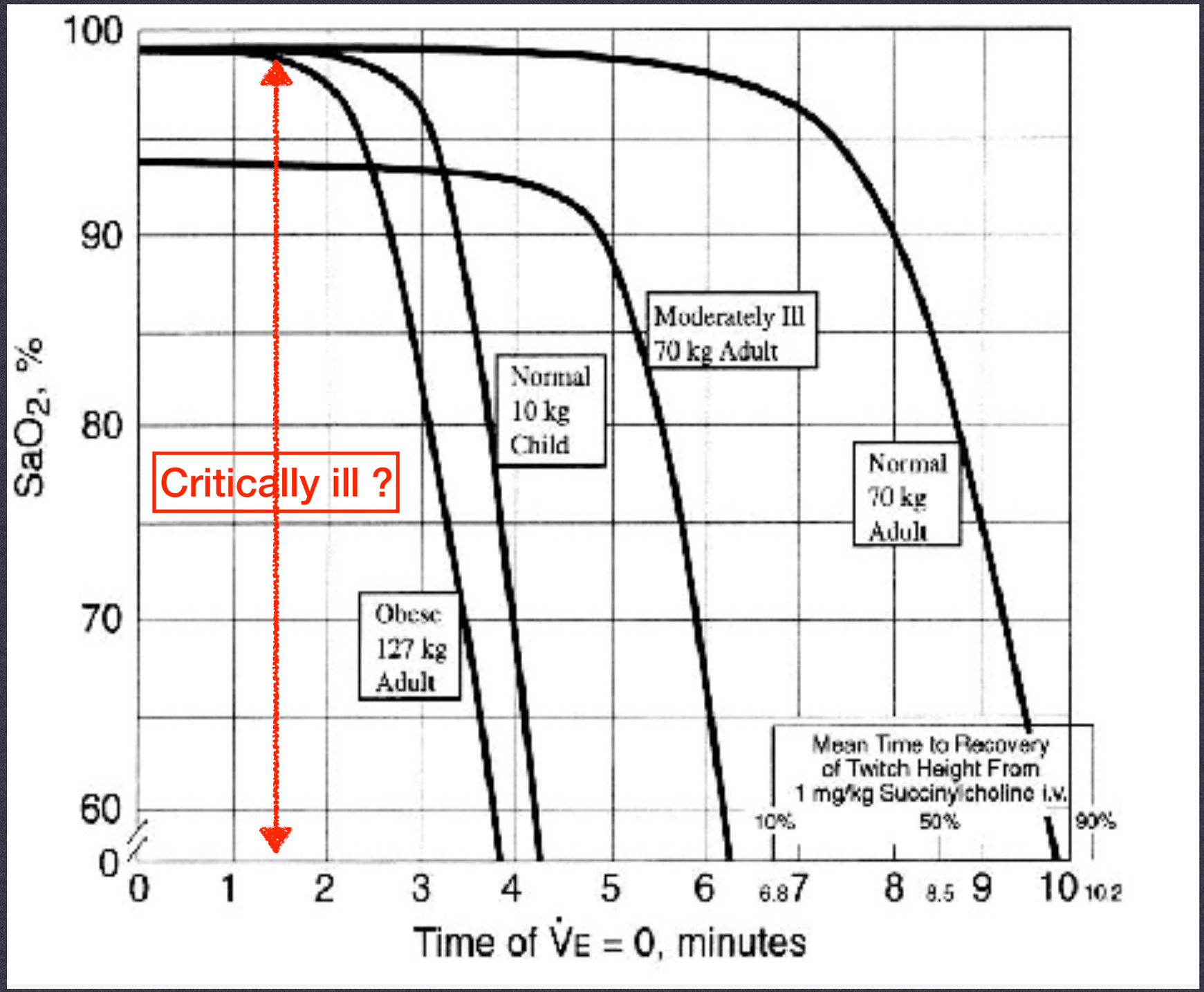
	FRC
Normal	2500
ARDS	1000





“baby lung”

Time to Hemoglobin Desaturation with initial $F_AO2 = 0.8$



Benumof Anesthesiology. 1997;87:979-82.

Muscle relaxants - Needed?

What Can We Do to Prevent Tracheal Intubation–Associated Cardiac Arrest?*

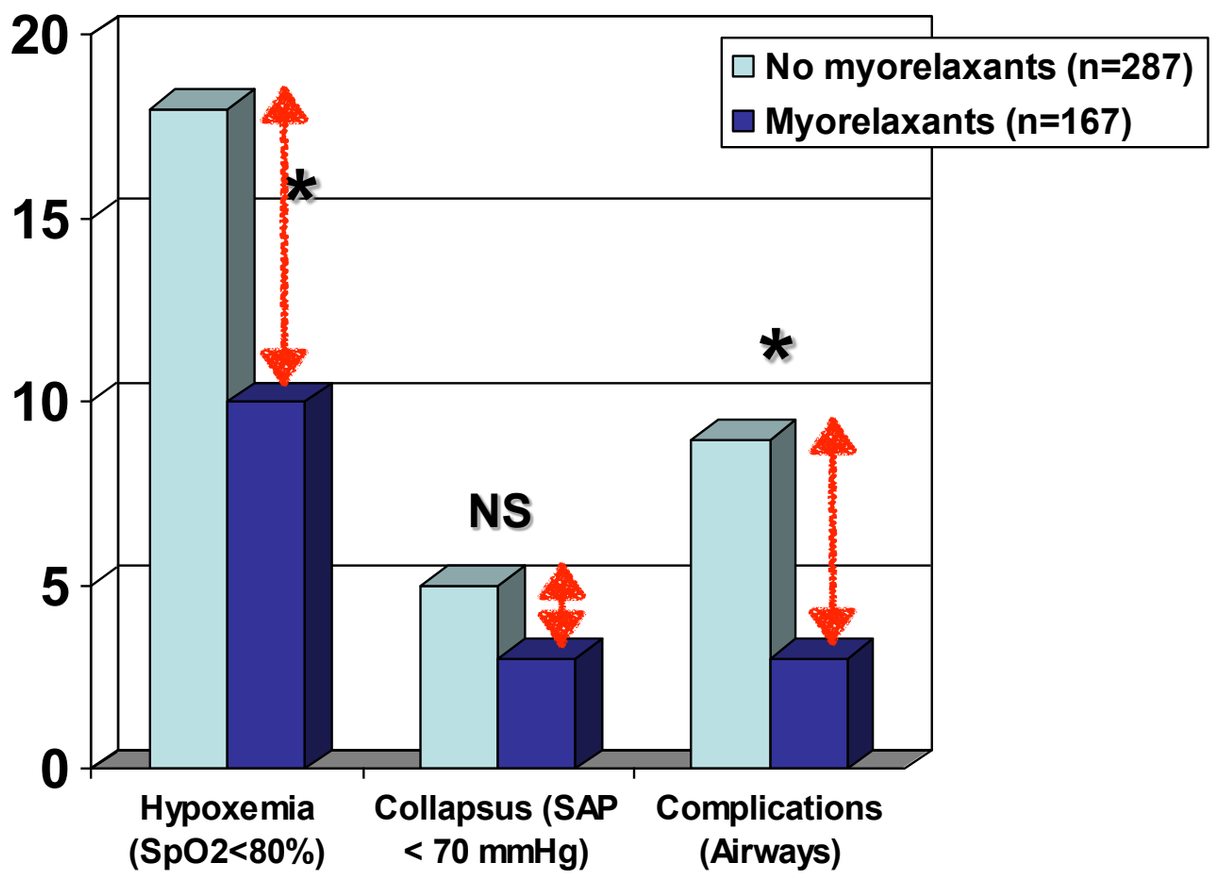
"The use of neuromuscular blockade was associated with a lower risk of cardiac arrest…"

CCM, Sept 2016;Vol 44;No.9

Muscle relaxants - Needed?

Neuromuscular blocking agent administration for emergent tracheal intubation is associated with decreased prevalence of procedure-related complications*

Susan R. Wilcox, MD; Edward A. Bittner, MD, PhD; Jonathan Elmer, MD; Todd A. Seigel, MD;
Nicole Thuy P. Nguyen, BS; Anahat Dhillon, MD; Matthias Eikermann, MD, PhD; Ulrich Schmidt, MD, PhD



Wilcox; CCM 2012

Muscle relaxants
- expect the unexpected in ITU

- A “normal” dose of muscle relaxant may not paralyse the larynx
- Why ?
    - ↑ ECF (~ 2-3 X increase)
    - Receptor changes

Increased ECF

M BEST MOTOR RESPONSE	Localises to pain	5	
	Flexion / withdrawal to pain	4	
	Abnormal flexion to pain (decorticate posture)	3	
	Extension to pain (Decerebrate posture)	2	
	None	1	
	Muscle relaxant?	Y/N	
	TOTAL SCORE		15 15 15

			Time:	
PUPILS	RIGHT	SIZE (mm) REACTION: + / - / s	2	2
			4	+
	LEFT	SIZE (mm) REACTION: + / - / s	2	2
			3	3

1 2 3 4 5 6 7 8

PUPIL SIZE IN MILLIMETRES

CCMDS	
00.00: DATA ENTERED	Initials

TOTAL OUTPUT INTO DRAINS IN THIS 24 HOUR PERIOD			
Drain 1:	Drain 2:	Drain 3:	Drain 4:

*IMPORTANT: Daily weight **must** be performed with **ONLY**: 1 pillow, 2 sheets, 1 gown, 1 inco. pad, Nimbus pump, SCD pump and **EMPTY** drainage / catheter bags.

TODAY'S BALANCE	CULMULATIVE BALANCE	*DAILY WEIGHT
		KG
		Time Weighed:

Design: Jayne McNally RN - Ealing Hospital ICU. Sept 2012

ADMISSIO

ORAL DY
SCORE TO

MI
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URIN
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STOO
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SWA
24 H
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URINALYSIS
LEU
NITR
PRO
pH
BLO
SPEC
KETO
GLU

19 20 21 22 23

5 L ?

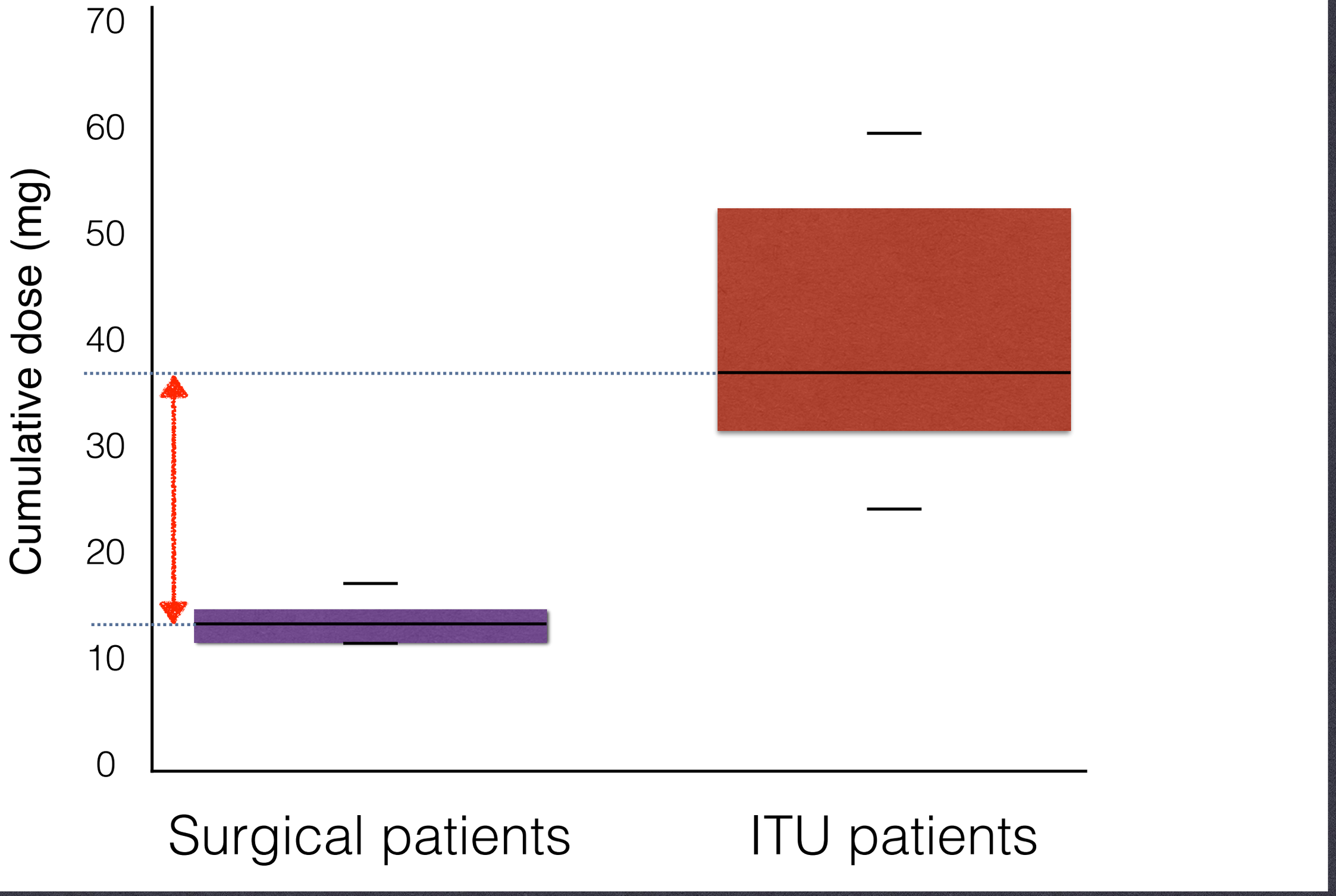
10 L ?

20 L ?

Muscle relaxants
- expect the unexpected in ITU

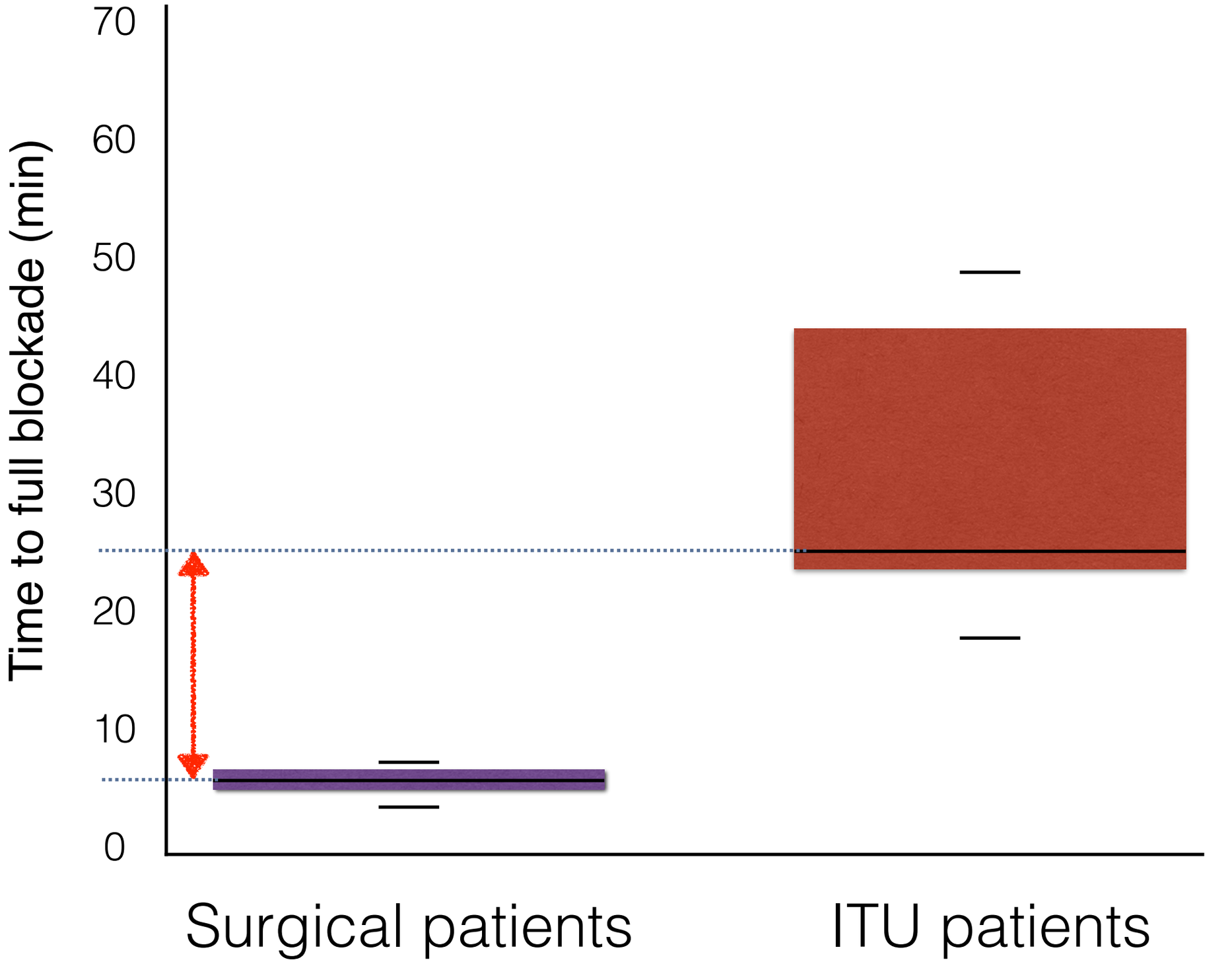
- A “normal” dose of muscle relaxant may not paralyse the larynx
- Why ?
    - ↑ ECF (~ 2-3 X increase)
    - Receptor changes

- Bougie may not solve your problem (tube gets “gripped”)
- Danger of laryngeal trauma
- Always use a nerve stimulator…don’t guess



CUMULATIVE DOSES OF CIS ATRACURIUM

Dieye et al. Annals of Intensive Care 2014, 4:3



TIME OF NEUROMUSCULAR BLOCKADE

Dieye et al. Annals of Intensive Care 2014, 4:3

Muscle relaxants - PNS required?

BJA
NEW SPECIAL ISSUE
Current Challenges in Vascular Anaesthesia
FREE TO READ ON

Neuromuscular Blockade in the Critically Ill

Philip E. Walsh, Anaesthetic Registrar John Vogel
Ealing Hospital

Re: "Airway management in the critically ill: the same, but different" Higgs, et al., 117 (suppl 1): i5-i9

The critically ill seem to display a resistance to NMBDs which has been the subject of multiple case reports and review articles [2, 8, 6]. While the definitive aetiology of this resistance is uncertain, it is thought that changes in receptor affinity [3] and in volume of distribution both play an important role. Analogously, recent publications have clearly demonstrated that there is significant under-dosing of certain water soluble, concentration dependent antibiotics in the critically ill. This has been attributed to the fact that the dosages employed were based on studies in relatively healthy patients where the pharmacokinetics especially the volume of distribution - is very different to the severely ill.[7, 5, 4].

Knowing this, is it not now time to consider the use of a nerve stimulator as mandatory when managing the airway of a critically ill patient?

Other considerations

Cardio-vascular effects

- Induction agent
  - Etomidate?
- Effect of IPPV on venous return
- Videolaryngoscopy

Etomidate

"Although … has minimal cardiovascular depression…it suppresses adrenal steroid genesis…a single dose of etomidate for intubation in patients with sepsis **increases risk of mortality**"

Culbertson BH,, et al. Intensive Care Med 2009;35:1868–1876.

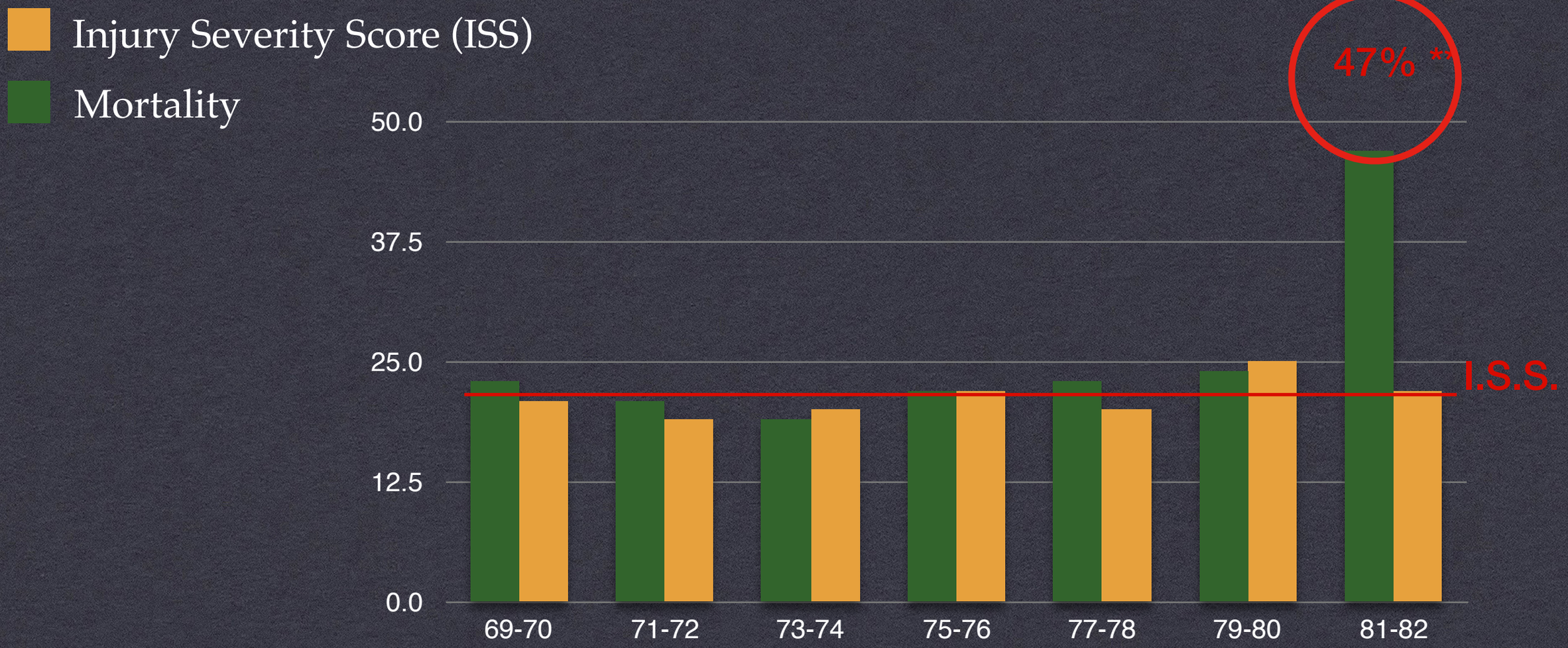
Chan CM, Crit Care Med 2012;40:2945–2953.

APSF Newsletter June 2016

Etomidate and mortality

Anaesthesia
Journal of the Association of Anaesthetists of Great Britain and Ireland

Mortality amongst multiple trauma patients admitted to an intensive therapy unit

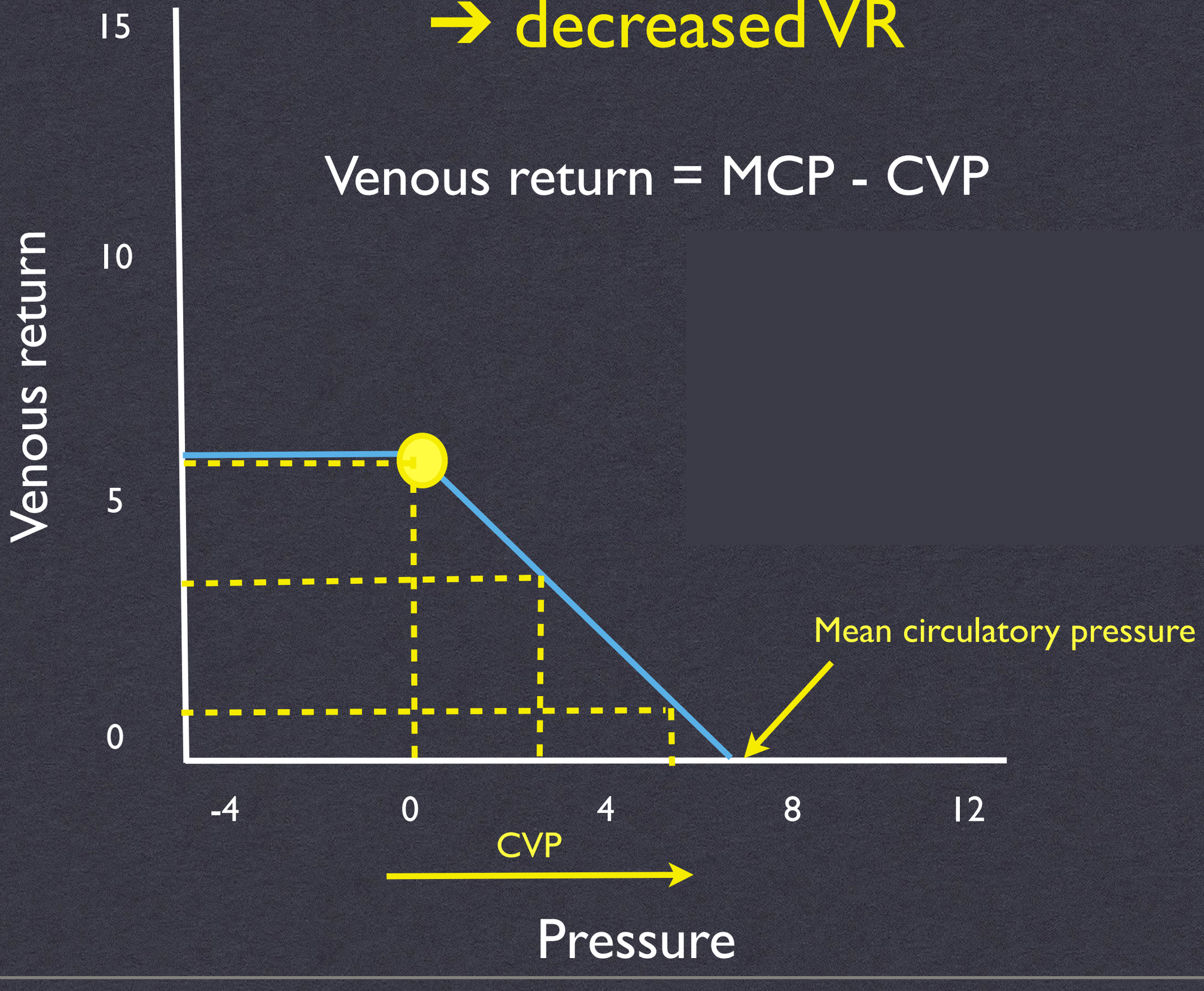


Watt I, Ledingham IM.
Anaesthesia 1984;39:973–81.

EFFECTS OF IPPV

High airway pressure → high CVP → decreased VR

Venous return = MCP - CVP



VIDEOLARYNGOSCOPY ?

VIDEOLARYNGOSCOPY ?

[Original Research **Critical Care**]

CHEST

Video Laryngoscopy for Endotracheal Intubation of Critically Ill Adults

A Systemic Review and Meta-Analysis

CrossMark

CHEST 2017; 152(3):510-517

"The VL technique did not increase the first-attempt success rate .... These findings do not support routine use of VL in ICU patients."

Cabrini *et al. Critical Care* (2018) 22:6
DOI 10.1186/s13054-017-1927-3

Critical Care

RESEARCH Open Access

Tracheal intubation in critically ill patients: a comprehensive systematic review of randomized trials

CrossMark

"Videolaryngoscopy was associated with severe adverse effects in multiple trials."

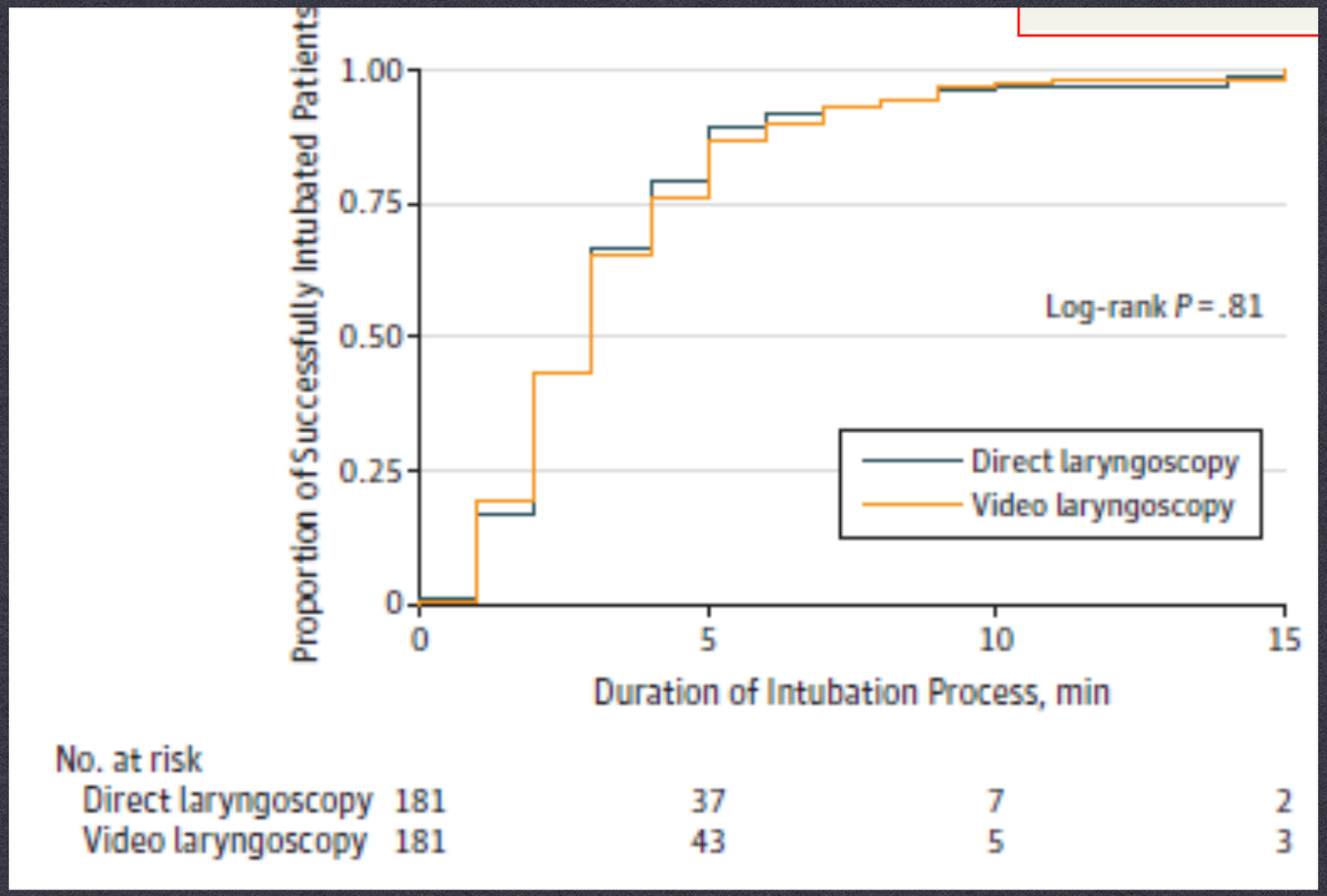
VIDEOLARYNGOSCOPY ?

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Video Laryngoscopy vs Direct Laryngoscopy on Successful First-Pass Orotracheal Intubation Among ICU Patients

A Randomized Clinical Trial

JAMA. 2017;317(5):483-493.



"compared with direct laryngoscopy did **not improve first-pass Intubation rates** and was associated with **severe life-threatening complications**"

CHECKLISTS ?

CHECKLISTS ?

Invasive Procedure Safety Checklist: ITU INTUBATION

BEFORE THE PROCEDURE

Preparation

Have all members of the team introduced themselves?	Yes ☐ No ☐
Is Patient Position Optimised?	Yes ☐ No ☐
Are spinal precautions required?	Yes ☐ No ☐
Pre-oxygenate: 100% FiO2 for 3 mins	Yes ☐ No ☐
Are nasal cannulae for apnoeic ventilation needed?	Yes ☐ No ☐
Is Water's circuit available and ready?	Yes ☐ No ☐
Is cricoid pressure considered and NGT aspirated?	Yes ☐ No ☐
Post intubation sedation ready?	Yes ☐ No ☐

Equipment and Drugs

Is Monitoring attached ? (ECG, SpO2, BP on regular cycling, EtCO2)	Yes ☐ No ☐
Is suction ready?	Yes ☐ No ☐
Is adequate venous access in place?	Yes ☐ No ☐
Are working Laryngoscope/s and bougie ready?	Yes ☐ No ☐
Are Endotracheal tube/s ready?	Yes ☐ No ☐
Are Oropharyngeal airways and iGels available?	Yes ☐ No ☐
Is Difficult airway trolley likely to be needed?	Yes ☐ No ☐
Are Drugs and Vasopressors ready?	Yes ☐ No ☐
Any Drug allergies Known?	Yes ☐ No ☐

Team

Is senior help needed?	Yes ☐ No ☐
Is Role allocation clear? (Intubator, drugs, assistant, cricoid, MILS)	Yes ☐ No ☐
Is difficult airway anticipated?	Yes ☐ No ☐

TIME OUT

Verbal confirmation between team members before start of procedure

Were difficult airway plans discussed?	Yes ☐ No ☐
Is senior help needed?	Yes ☐ No ☐
Is role allocation clear? (intubator, drugs, assistant, cricoid, MILS)	Yes ☐ No ☐
Is difficult airway anticipated?	Yes ☐ No ☐
Any concerns about procedure?	Yes ☐ No ☐

If you had any concerns about the procedure, how were these mitigated?

Procedure date: ☐ Time: ☐

Operator: ☐

Observer: ☐

Assistant: ☐

Level of supervision: SpR ☐ Consultant ☐

Equipment & trolley prepared: ☐

SIGN OUT

Endotracheal position confirmed (EtCO2 trace)?	Yes ☐ No ☐
Tube depth checked (B/L Air entry)?	Yes ☐ No ☐
ETT secured and cuff pressure checked?	Yes ☐ No ☐
Nasal O2 Removed?	Yes ☐ No ☐
Appropriate Ventilator settings confirmed?	Yes ☐ No ☐
Analgesia and sedation started?	Yes ☐ No ☐
ICP optimisation required? D/W Neurosurgeon?	Yes ☐ No ☐
Chest X-Ray required?	Yes ☐ No ☐
Hand over to nursing staff?	Yes ☐ No ☐

Signature of responsible clinician completing the form ☐

Patient Identity Sticker:

Add PNS !!!

The Faculty of Intensive Care Medicine

intensive care society
care when it matters

CHECKLISTS ?

Cabrini *et al. Critical Care* (2018) 22:6
DOI 10.1186/s13054-017-1927-3

Critical Care

RESEARCH Open Access

Tracheal intubation in critically ill patients: a comprehensive systematic review of randomized trials

"…no effect was found for use of a checklist.."

[Original Research]

CHEST

A Multicenter Randomized Trial of a Checklist for Endotracheal Intubation of Critically Ill Adults

CHEST 2017

"pre-procedure checklist…..no difference between the checklist and usual care in severe life-threatening procedural complications"

Bottom line

Never undertake this lightly

Only change the tube once you have tried everything else.

Always have lots of back up

(in both material, manpower and a plan)

Use a **nerve stimulator**

Get help **Be prepared**

IF YOUR ARE NOT NERVOUS, YOU JUST DON'T UNDERSTAND

Further reading

BJA

British Journal of Anaesthesia, ■ (■): 1–30 (2017)

doi: 10.1016/j.bja.2017.10.021

Special Article

SPECIAL ARTICLE

Guidelines for the management of tracheal intubation in critically ill adults

A. Higgs[1,*], B. A. McGrath[2], C. Goddard[3], J. Rangasami[4], G. Suntharalingam[5], R. Gale[6], T. M. Cook[7] and on behalf of Difficult Airway Society, Intensive Care Society, Faculty of Intensive Care Medicine, Royal College of Anaesthetists

INTUBATION IN THE ITU

THE NURSES PERSPECTIVE

S/N CLAIRE McANULTY
ITU M+M

April 17, 2018
12:00
Anaesthetic library

NURSES ROLE WITH INTUBATION

- Ensuring room checks are completed
- Ensuring a safe space is available for intubation
- Preparing equipment and ensuring the equipment works
- Preparing medication according to doctors preference
- Allowing only the necessary people to be involved

TOO MANY COOKS

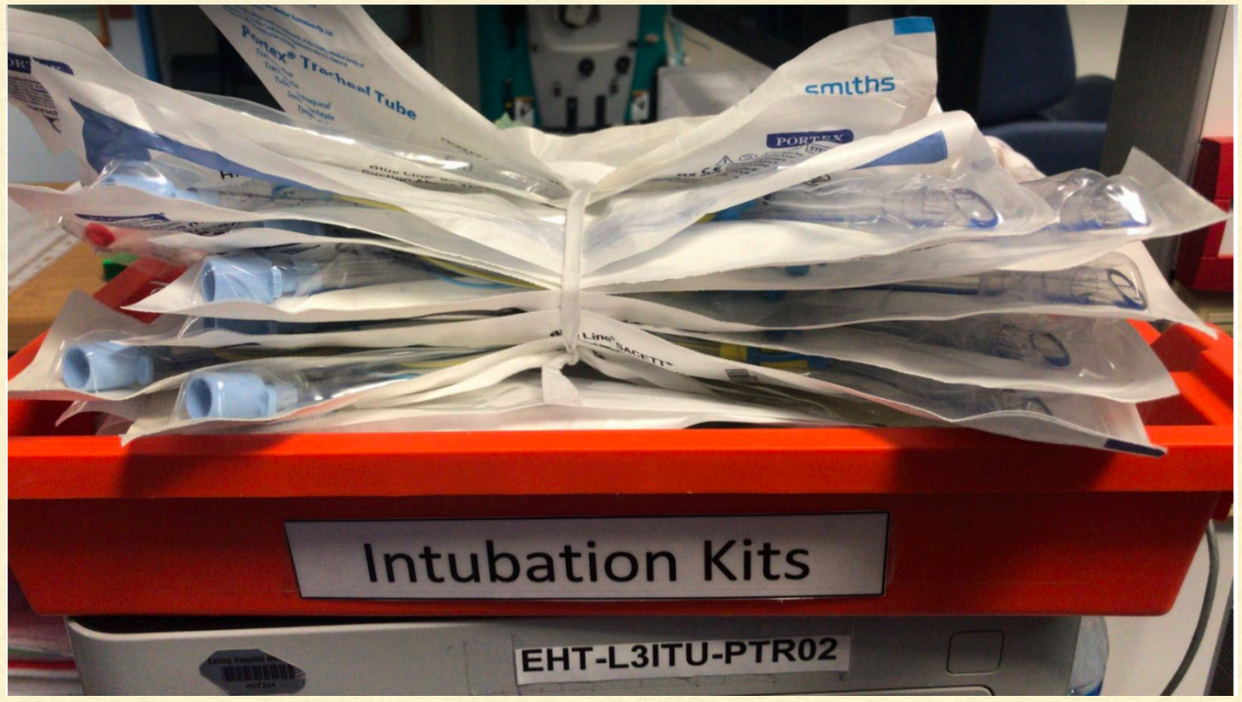
E.G. DISORGANISED ENVIRONMENT IF TOO MANY PEOPLE INVOLVED

PROBLEMS THAT OCCURRED WITH THIS INTUBATION

- CO2 monitor not working, alternative mode of monitoring was sought
- Equipment disorganised
- Too many people involved, roles not clear.
  - Approx. 7 people in the room

IMPROVEMENT IDEAS

- CO2 monitoring now connected to the Space Lab machines
- Intubation tray in ICU :



IMPROVEMENT IDEAS

- Ideal intubation kit :

IMPROVEMENT IDEAS

- New intubation checklist implemented on the unit. ? Audit
- Training and simulation for new nurses / nurses not exposed to intubation
- Ideally only 2 nurses needed.
  - One assisting the airway person with the necessary equipment
  - One preparing equipment and gathering medication/equipment not predicted such as lignocaine used for this patient
- Roles are then clear

Winner of the “Not My Job” Award